Free to Air Digital Satellite DTR (Digital Television Recorder) Requirements Profile

For New Zealand Free to Air Digital Broadcasting

STRICTLY PRIVATE AND CONFIDENTIAL

Document History

Version	Date	Details
1.0	28/04/09	First Release
1.1	15/07/09	Changed bouquet IDõs, changed items 7.1 and 8.2

Date: 15 July 2009

© Freeview Limited

Table of Contents

1 Introduction 3
1.1 Proposition 3
1.2 Purpose 3
1.3 Scope 4
1.4 Glossary 4
1.5 References 6
2 Overview 8
3 DTR Receiver Profile 9
4 Key Elements of Software 27
4.1 EPG 27
4.2 Subtitles 27
4.3 Interactive Services 27
4.4 Software Upgrades 27
4.5 Logical Channel Numbering 28
5 Region Service Functionality 29
5.1 Background 29
5.2 The Technology 29
5.3 The Process 29
5.4 The Detail 30
5.4.1 Bouquets 30
5.4.2 Button Assignments (on remote control units) 31
5.5 Summary 33
6 NZ MHEG-5 extensions to MHEG-5 UK Profile v1.06 34
6.1 Purpose 34
6.1.1 Scope 34
6.2 Specifications 34
6.2.1 Miscellaneous 34
6.2.2 Platform identification 34
6.3 Character set extensions 35
6.3.1 Maori character extensions 35
6.4 User input extensions 36
6.4.1 EPG key 36
6.5 PVR extensions 38
6.5.1 Implementation 38
6.5.2 GetEngineSupport feature string 38
6.5.3 EngineEvents 38
6.5.4 Resident programs 38
6.6 Regionalised broadcasts 41
6.7 Profiles 42
6.8 Requirements of profiles 42
7.0 DTR Functional Requirements 43

© Freeview Limited

1 Introduction

1.1 Proposition

This baseline Profile, which is based upon open standards, is for a Digital Satellite (DVB-S) Digital Television Recorder or DTR (also generically called a Personal Video Recorder or PVR) for reception of "free to air" or unencrypted services. The Freeview digital television and radio service represents NZ Free-to-Air broadcasters and primarily broadcasts to Freeview approved receivers.

The Freeview Satellite service co-exists with the proprietary Sky (pay-tv) satellite receiver population. The EPG and interactive service however are provided by a middleware application programme interface that is different from that provided as part of the Sky subscription services.

Items in this specification are divided into "Required" and "Optional" categories. Where a feature is stated as "Required", its inclusion is necessary for the achievement of a minimum compliance with Freeview transmission requirements. Additional Optional functions may be added by the vendor to enhance the consumer proposition and these will be welcomed by Freeview. In order to be compliant, where a feature is "Optional" and is included in an offered receiver design, the optional feature must be implemented in accordance with the associated referenced specifications.

This specification is not a comprehensive list of all relevant standards relating to consumer equipment that can provide digital satellite reception but rather a list of those standards considered relevant to Freeview requirements.

The profile is based upon the UK DTG D-Book which references open standards, such as DVB, or includes open implementations which are in use on the UK DTT platform. Changes and additions have been made in this document to suit the required digital satellite platform in New Zealand.

1.2 Purpose

The purpose of this document is to describe the requirements for a Freeview branded Free to Air satellite DTR for New Zealand and to refer to detailed specifications that are required for conformant implementation. The profile is in the form of a hardware specification outline, together with an overview of software requirements. The software is to be routinely capable of being upgraded via "through-the-air-download"

A "Response" column is included in section 3 to enable detailed feedback on each requirement in the specification if the manufacturer wishes to advise Freeview of its products conformance or any variation from the stated function.

© Freeview Limited

1.3 Scope

The document sets out to identify the baseline functional specification of an MPEG-2 standard definition Freeview digital satellite receiver with extensions for hard-drive recording. It does not cover cosmetic or manufacturing designs.

It is intended that a satellite DTR conforming to this profile should comprise part of a domestic installation, in conjunction with an external, fixed satellite antenna and LNB (together "the outdoor unit") connected to the DTR input(s). The DTR output(s) will connect to the television display (and possibly other domestic equipment).

It is the aim of the specification to ensure that the Freeview approved receiver in New Zealand satisfies the minimum requirements of each broadcaster. The DTR will operate as defined in the "Freeview Transmission Rules for Freeview DTH Network (New Zealand)" document.

The Freeview satellite service will make use of transmissions from the Optus D1 satellite to located at 160° East. The transmissions may be either vertically or horizontally polarised and will be defined within the NIT tables via the satellite_delivery_system_descriptor (tag 0x43).

1.4 Glossary

AC-3	Dolby Digital (5.1 Channel)
AFD	Active Format Descriptor
Alphabetic	Characters that typically represent a component of a spoken word. For example the Latin derived characters used to represent English or the Cyrillic characters used to represent Russian.
BER	Bit Error Rate
C/N	Carrier to Noise Ration
CA	Conditional Access
CharacterSet	MHEG term defined as: Identification of the character set, or set of character sets, that shall be used by default for Text rendering. This Integer shall be encoded with a value representing the character set. The application domain shall define a range of CharacterSet and its semantics.
CID	Content Identifier Descriptor
ContentHook	MHEG term defined as: Determine the encoding format of the data included or Referenced by the Content attribute.
CRID	Content Reference Identifier

© Freeview Limited

CVBS	Composite Video Baseband Signal
CVBS	Composite Video Blanking and Synchronization
D-Book	See technical standards listed elsewhere in this document
DTCP	Digital Transmission Content Protection
DTG	Digital Television Group ï a UK digital television industry organisation
DTR	Digital Television Recorder which is equivalent to a PVR
DTT	Digital Terrestrial Television
DVB	Digital Video Broadcast organisation
DVB-T	DVB-Terrestrial
EBU	European Broadcasting Union
EIT	Event Information Table
EPG	Electronic Programme Guide
ETSI	European Telecommunication Standards Institute
FEC	Forward Error Correction
Freeview	Consumer Brand and company name of the Digital Platform service provider in NZ
FTA	Free to Air
HD	High Definition
HDCP	High-Bandwidth Digital Content Protection
HDMI	High-Definition Multimedia Interface
HDTV	High Definition Television
iDTVs	Integrated Digital Televisions
IRD	Integrated Receiver Decoder
May	Indicates an event or provision which is permitted, but not mandatory
MHEG-5	A standard devised for the middleware for interactive services. MHEG stands for ñMultimedia and Hypermedia information coding Expert Groupò
MP@HL	Main Profile at High Level
MP@ML	Main Profile at Main Level
MPEG	Moving Pictures Expert Group
Must	Indicates that a third party must comply to ensure correct operation

NIT	Network Information Table
OSD	Onscreen Display
PAL	Phase Alternating Line
PVR	Personal Video Recorder which is equivalent to a DTR
QPSK	Quadrature Phase Shift Keying
RS	Reed-Solomon
S/PDIF	Sony/Philips Digital Interface
SD	Standard Definition
SDTV	Standard Definition Television
Shall	Indicates a mandatory provision
Should	Indicates a desirable, but not mandatory, provision
SI	Service Information
STB	Set-Top-Box, which is equivalent to a Digital Terrestrial Receiver
Transport Stream	A stream format defined in [MPEG SYS]
TS	Transport Stream: A data structure defined in ISO/IEC 13818-1
UTF	Unicode Transformation Format
Will	Indicates an assumption about existing states or future events
Y/C	S-Video Signal
YPbPr	Wideband Component Video Signal

1.5 References

[D-BOOK]	ñDigital Television Group: Digital Terrestrial Television, Requirements for Interoperability, Issue 6.0ò
[ETSI-MHEG]	MHEG Broadcast Profile ETSI ES 202 184 v1.1.1ñ
Digital TV Group	DTG Functional Specification for Digital TV Recorders. Version 1.1
DTG DTR	Version 1.1
	DTG Functional Specification for Digital TV Recorders

DVB Coding	Version ETR 101 154 v1.7.1 Digital Video Broadcasting (DVB); Implementation Guidelines for the use of video and audio coding in Broadcasting Applications based on the MPEG-2 transport stream
DVB SI	Version EN300 468 V1.9.1 Digital Video Broadcasting (DVB) Digital Broadcasting Systems for television, sound and data services. Specification for service information (SI) in Digital Video Broadcasting (DVB) ETSI
DVB SI Codes	Version ETSI 162 Digital Broadcasting Systems for Television, sound and data services, allocation of service information (SI) codes for Digital Video Broadcasting (DVB) systems ETSI.
DVB SI Guide	Version TR 101 211 V1.9.1 Digital Video Broadcasting (DVB) guidelines on implementation and usage of Service Information (SI).
DVB Sub	Version ETSI 300 743 Digital Video Broadcasting (DVB); DVB Subtitlling Ssytems ETSI
DVB-T	Version EN 300 744 V1.5.1 Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for digital terrestrial television
EN 300 468 V1.9.1	Digital Video Broadcasting (DVB) Digital Broadcasting Systems for Television, Sound, and Data Services. Specification for service information (SI) in Digital Video Broadcasting (DVB) European Telecommunication Standards Institute ETSI
EN 300 472 v1.2.2	Digital Video Broadcasting (DVB) Digital Broadcasting Systems for Television, Sound, and Data Services. Specification for conveying ITU-R system B Teletext in Digital Video Broadcasting (DVB) Bitstreams. European Telecommunication Standards Institute ETSI.
EN 300 744 v.1.5.1	Digital Video Broadcasting (DVB); DVB Framing structure, Channel coding and modulation for digital terrestrial television. European Telecommunications Standards Institute. ETSI.

© Freeview Limited

EN50221	Digital Video Broadcasting (DVB) Common Interface Specification for Conditional Access and other Digital Video Broadcasting Decoder Applications
ETR 101 154 v1.7.1	Digital Video Broadcasting (DVB); Implementation Guidelines for the use of video and audio coding in Broadcasting Applications based on the MPEG-2 transport stream
ETR 289	Digital Video Broadcasting (DVB) - Support for Use of Scrambling and Conditional Access (CA) within digital broadcasting systems
ETSI 162	Digital Broadcasting Systems for Television, sound and data services, allocation of service information (SI) codes for digital Video Broadcasting (DVB) systems. European Telecommunication Standards Institute. ETSI.
ETSI 300 743	Digital Video Broadcasting (DVB); DVB Subtitling Systems. European Telecommunication Standards Institute. ETSI.
ETSI MHEG	Version ES 202 184 V1.1.1 MHEG-5 Broadcast Profile
Freeview NZ	TRANSMISSION RULES FOR FREEVIEW DTH NETWORK (New Zealand).
Logical Channel Numbering	The logical channel numbering specification used is the Australian variation to the UK specification. It is titled ñFree TV Australia Operational Practice OP-41òand can be viewed at http://www.freetvaust.com.au/SiteMedia/w3svc087/Uploads/Documents/18efb4b4-cd30-4da4-a3ae-5fb4f4b64884.pdf
MHEG	Version 1.06.05 MHEG 1.06 UK Profile as published in [D-Book]
MPEG SYS	Version ISO/IEC 13818-1 Information Technology ï generic coding of moving pictures and associated audio: systems
NorDig Unified ver 1.0.2	NorDig Unified Requirements for Integrated Receiver Decoders for use in cable, satellite, terrestrial and IP-based networks.
TR 101 211 V1.9.1	Digital Video Broadcasting (DVB); guidelines on implementation and usage of Service information(SI)

© Freeview Limited

2 Overview

This specification uses the UK DTG D-BOOK (V5) as its primary reference, in particular Chapter 22, section 8.7 and 8.11 of Chapter 8 UK DTT SI rules of Operation Receiver Requirements.

© Freeview Limited

3 DTR Receiver Profile

The 'Manufacturers Response' column in the following table is included to enable a detailed response to each specification item.

Item No.	Resources	Reference/Detail	Notes	Manufacturers Response
1	The processing power and memory configuration of the DTR must be suitable for the routine operation of FTA digital satellite reception, (DVB-S), together with the embedded operation of MHEG-5 Version 1.06 NZ-variant applications, and the provision of the routine replacement of all software via 'through-the-air-download'. The related parameter limits specified in this section are believed to be the minimum necessary to achieve these requirements.			
1.1	DDRAM	64 MBytes	Minimum baseline functionality	
1.2	Flash	4 Mbytes	Minimum baseline functionality	
1.3	CPU Processor Speed	166MHz	Minimum baseline functionality	
1.4	HDD	160GB SATA	Minimum acceptable baseline	
1.5	Common Interface	The mandatory requirement for at least one DVB Common Interface is temporarily suspended, until a more suitably secure and deployed standard is available. Manufacturers of conformant products will be required to add this capability to new models when in the future a suitable standard is adopted.	ON HOLD pending further consideration by the Freeview technical committee.	

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
2	**Services** **Summary**	The DTR must give access to all NZ free-to-view broadcast digital satellite television, radio and enhanced/interactive television services. This must include the capability to efficiently present radio channels, DVB subtitles, Digital Text and Enhanced Broadcast elements of all services. It must present DVB subtitles when broadcast and if requested by the viewer; manage the output video in both widescreen 16:9 and 4:3 picture formats to suit the connected display. Where possible DTRs should be able to present both subtitles and interactive graphics simultaneously. However, not all DTRs may be able to do this, the result being that interactive content will not always be available to viewers that wish subtitles to be presented. The DTR shall also be capable of utilising DVB Bouquet Association Tables and Logical Channel Numbering that may be broadcast as part of the Freeview DVB-SI, in order to be able to implement the Freeview regional services requirement. This regional services requirement is described in Section 5 of this document.			
2.1	Time-exclusive services	The DTR shall handle the transition between the active and inactive states of a time exclusive service in an orderly fashion, presenting clean transitions into and out of video, audio and inter-active content streams without presentation of any content or application not intended for the selected service.			
3.0	**Functions**				
3.1	MPEG2 Video	MPEG 2 MP@ML, video resolution, 720x576 (PAL)	Req	ISO/IEC 13818	
3.2	Audio Decoding	MPEG1 Layer II /Musicam, audio mode stereo. Sampling Rate 32, 44.1 & 48KHz	Req	ISO/IEC 11172-3	
3.3		Dolby Digital (AC-3) 32, 44.1 & 48KHz ï Pass Through on SPIDF.	Opt	ISO/IEC 14496-3 and signalled by TS 101 154, Annex C. Only Pass through of DD audio to the Digital Audio Connector is required	
3.4		Dolby Digital (AC-3) 32, 44.1 & 48KHz ï Downmix to stereo Pair	Opt	ISO/IEC 14496-3 and signalled by TS 101 154, Annex C.	

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
3.5	Subtitles	DVB Subtitles.	Req	ETSI EN 300 743 V1.3.1 DVB subtitles shall be invoked from a suitable labelled remote control key which is always under the control of the DTR. i.e. not under control of DTR group 13 of MHEG	
3.6	Display of subtitles during enhanced programming	Where both are components of a service, ability to simultaneously present both Subtitles and interactive application graphics if required by viewer preferences. (D-Book sections 17.4 and 15.2) Note: If simultaneous presentation is not possible either an automated transition is required or as a minimum an onscreen message to warn the user that they cannot launch the interactive application until subtitles is disabled. Generally subtitles with have priority over interactive applications, with the exception on the Freeveiw EPG application which shall have priority over subtitles.	Opt Req	DTRs that are capable of simultaneously presenting both subtitles and interactive application graphics must observe the rules enabling applications to suspend presentation of Subtitles where editorially required.	

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
3.7	Teletext	A DTR shall either: a/ have the facility to acquire teletext as defined in EN 300 472 (DVB: Specification conveying ITU-R System B Teletext in DVB Bitstreams) and reinsert it in the vertical blanking interval (VBI) of the composite video output according to specification ITU-R BT.653-2, Teletext Systems and / or b/ include a Teletext decoder as defined by ETSI standard 300 706 Enhanced Teletext Specification including up to Teletext V1.5 and display Teletext pages on the attached TV or video monitor via an on-screen-display (OSD) that can be viewed via all available video output interface signals. A suitable remote control button other than the ðTEXTôbutton must be provided to launch the Teletext OSD display	Req	DTRs must support Teletext either via OSD or VBI pass-through mechanisms. Providing both mechanisms is optional. The ðTEXTôRCU button is under MHEG control ï see 3.11.	
3.8	Digitext	A Digitext service may be provided via an MHEG-5 Application. This will be accessed by the ñTEXTòButton on the RCU.	Req	Via an MHEG-5 Application	
3.9	Audio Descriptors	D-Book Section 4 DTRs that are capable of presenting audio description shall provide at least the minimum user controls. (D-Book 4.0 section 4.5)	Opt	Design of controls should take into account that many users of audio description are visually impaired.	
3.10	Multi-Language Support	The DTR is to at least support a primary and secondary audio language based on the ISO 639 language descriptors associated with the audio-streams in the ISO/IEC 13818 MPEG2 transport stream.	Req	If the secondary audio language is not present then the DTR shall automatically choose the primary audio language	
3.11	Widescreen	For SD video resolution output format D-Book V4 Section 3.4 and Section 24.2	Req		

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
3.12	Active Format Descriptors	Ability to handle 16:9 widescreen and 4:3 picture format changes as detailed in the ótransmission rulesóincluding support for correct aspect ratio and Active Format Descriptors	Req	DTR shall <u>not</u> support WSS insertion on any analogue outputs	
3.13	14x9 processing	DTR <u>may</u> offer the option of a 14:9 (letter box) format when working with SD outputs on 4:3 displays (D-Book section 24.)	Opt		

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
3.14	OSD	Minimally Support for a 2 graphics layer model:- • Image Layer (a full colour layer to display I-Frame stills captured from the video decoder) Layer to support: Y=8 bit, Cb=8 bit, Cr=8 bit Chroma to be sub-sampled to either 4:2:0 or 4:2:2 Alpha blending need not be supported, but the layer may be shown or hidden. • Video Layer (a full colour layer displaying the output of the MPEG video decoder) Layer to support: Y=8 bit, Cb=8 bit, Cr=8 bit Chroma to be sub-sampled to either 4:2:0 or 4:2:2 Alpha blending need not be supported, but the layer may be shown or hidden. • OSD/Graphics Layer (an 8-bit palletised layer which can display region-based graphics) Each CLUT palette entry to support: Y=8 bit, Cb=8 bit, Cr=8 bit Chroma to be sub-sampled to either 4:2:0 or 4:2:2 Alpha blending to be either 6 bit across the entire layer, or 2 bit per pixel	Req	Video/Still Image layer. There is no requirement to display both still image and motion video at the same time, they are mutually exclusive. A palletised layer is the minimum requirement. Alternatively True Colour can be utilized	
3.18	DTR Character Set	The Character set of the DTR shall be the Character code table 00 ï Latin Alphabet as specified in IS0 6937.	Req	EN 300 468 Annex A	

Item No.	Resources	Reference/Detail		Notes		Manufacturers Response
3.19	Parental rating	DVB Rating: - 0 x 00 - 0 x 06 - 0 x 08 - 0 x 0C	NZ Translation: - undefined - G (to 9 years) - PGR (to 11 years) - AO (to 15 years)	Req	For values not defined in this table the Australian definition may be used or the level above e.g. if 0 x 07 was broadcast then it should be treated as 0 x 08. Therefore only a user setting of 0 x 08 or higher would allow the programme to be viewed. See DTR functions section below for use of parental ratings to control viewing of recorded programmes.	
4.0	**Tuner / Decoder**					
4.1	No. Of Tuners	2		Req	Minimum	
4.1	RF input connector	F-type female		Req		
4.2	RF loop-through connector	F-type female		Req		
4.3	RF/IF Frequency Range	950MHz to 2150MHz		Req		
4.4	Input impedance	75 ohm nominal		Req		
4.5	Input Signal Level / Receiver Sensitivity	-65dBm to -25dBm		Req		
4.6	Loop-Through Gain	0 dB typical		Req		
4.7	Supply LNB current	Up to a maximum of 500mA with overload protection; with a minimum capability of 300 mA		Req		

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
4.8	Supply LNB volts	Vertical polarisation : 13Vdc Horizontal polarisation : 18Vdc	Req		
4.9	Signalling	13/18V and 22kHz tone switching	Req		
4.10	DiSEqCÊ	Support for 1.0, 1.1, 2.0 or 2.1	Req		
4.11	Demodulation	QPSK - DVB-S standard, EN 300 421	Req		
4.12	Input Symbol Rates	2 MS/s to 45 MS/s	Req		
4.13	Spectral Inversion	Auto	Req		
4.14	Forward Error Correction Codes	½, 2/3, ¾, 5/6 7/8, Auto	Req		
4.15	Freeview Transponders	Freeview services are transmitted on the Optus D1 Satellite (160 degrees east). The primary carriers for Freeview services are as follows, however Freeview services may be available from any carrier on this satellite: The relevant parameters of the two carriers are: 1) Freq : 12.456V GHz , S.R: 22.500Msys/s, FEC: ¾, Vertical polarisation 2) Freq : 12.483V GHz, S.R: 22.500Msys/s, FEC: ¾, Vertical polarisation The Freeview Network ID is 0x2F			
4.16	LNB L.O.	The default LO frequency shall be 11.300GHz. The user may change the LNB LO of the receiver to 10.750GHz if required (via set up menu)	Req	The default LO of FTA satellite dish LNBsôin New Zealand is 11.300GHz, There is an increasing presence, however, of LNBs with LO of 10.750GHz.	

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
4.18	Scanning for Services	On the initial scan the DTR shall perform an automatic scan based on the NIT information found on the "home transponder" at 12.483 GHz. It shall find all transport streams and services and shall tune in to the correct DVB structure, channel coding, modulation. However the DTR shall only display services that are referenced in the regional Freeview BAT selected by the user during initial setup In addition to an automatic search it shall be possible to perform a manual search where the turning parameters are entered manually. New channels shall be added to the service list. No duplicated channels shall be displayed in the service list.	Req	The DTR shall not perform a "scanAdd" function thereby leaving old services within a channel list.	
5.0	**Over-Air Software Download**	The DTR shall support DVB System Software Update (SSU) to at least the simple profile. ETSI TS 102 006 refers.	Req		
6.0	**Service Information & Selection Summary**	As soon as a DTR is installed it must offer the viewer all services that may be received in that geographic region compliant with the Freeview regional advertising requirement as defined in section 5 of this document. The services being broadcast may change over time. To ensure that the viewer is always able to access all services being broadcast to the selected region, the receiver must detect and reflect to the viewer any such changes with minimal viewer involvement. All services have an associated (Logical) Channel Number. Use of the logical channel number ensures that the viewer becomes familiar with a specific remote control unit button number for each channel. Access to, and use of, accurate service information is essential if the viewer is to enjoy all of the content being broadcast. DTRs must offer a complete list of available services and information as carried in *'DVB S.I. EIT present/following'* about the current and following programmes. A comprehensive multi-day programme schedule will be broadcast as an EPG service to an MHEG-5 V1.06 application to the DTR.			

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
6.1	Scanning for Services	The DTR shall be capable of automatically detecting changes in the services configuration of each broadcast transport stream provided that such changes are implemented by the broadcaster in accordance to the ótransmission rulesô and are compliant with the DVB-SI standards, [ETSI EN 300 468], [TR 101 211]. The intent of this requirement is to allow the broadcaster to vary the services offering within the relevant broadcast transport stream(s) without the viewer needing to rescan the DTR.	Req		
6.2	Logical channel numbers	Ability to locate, store and handle services with Logical Channel Numbers (LCNs) within the ranges of 1 to 799.	Req		
6.3	Identification of service changes	Automatic identification / storage of services or service changes, without the need for user intervention, by reference to the NIT and/or SDT. It shall be without disturbance to the viewer and shall not require a rescan.	Req		
6.4	Selection via service list	The initial displayed service list following a full automatic scan must present services in ascending order of LCN.	Req		
6.5	Selection via numeric entry	Service selection via numeric entry shall always select a service with a corresponding LCN regardless of any viewer favourites	Req		
6.6	Hidden services	Services identified as ñhiddenò in the LCN descriptor shall not appear in the service list presented to the viewer. In addition such services shall also be identified as selectable by numeric entry.	Req		

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
6.7	EPG ñNow/Nextò	ôNow / Nextôscreen guide shall be derived using information from DVB SI EIT p/f tables as per EN 300 468. In addition the EIT p/f table with carry CRID information within a Content identifier descriptor to enable DTR series link recording as per sections 8.5.3.12 , 8.7 and 8.11 of the D Book. The presentation of the now/next banner is as per manufactures chosen user interface but it is desirable for the following information to be displayed in the bottom third of the screen. Programme Title (event name) Start time of now and next programme End time of now and next programme Logical Channel Number Channel Name Date Current time Plus ï single button press ï access to the programme synopsis (short event descriptor).	Req	The EPG ñNow and nextò should be displayed when the user changes channels for approx 2 secs and may also be launched using the i (info) button on the remote control. If a descriptor is missing from the EIT table ï the DTR shall <u>not</u> display an error.	

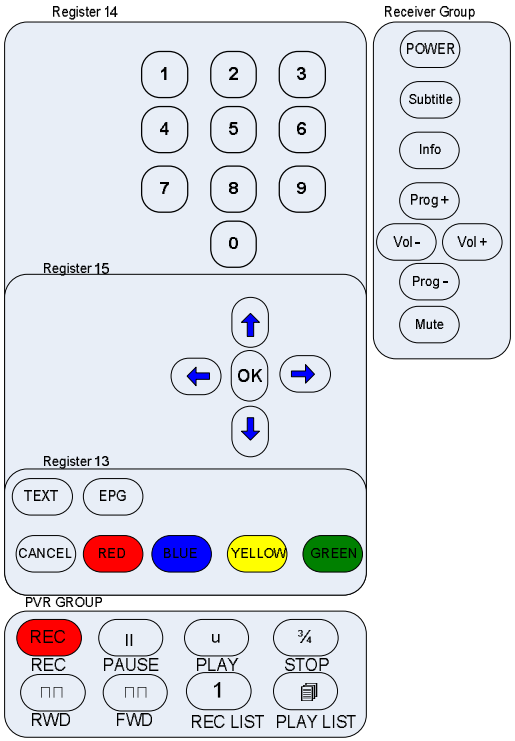
Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
6.8	EPG ò Scheduleò	An 8-day EPG will be provided as an MHEG-5 application. This application will be invoked using the EPG button on the remote control. The MHEG EPG will be utilised by the user to book a recording of an event. This content may be an individual programme, a series or a recommendation. In addition to the Mheg EPG will be a $EIT_{schedule\ table}$ as per EN 300 468 which will carry CRID information within a Content identifier descriptor to enable DTR series link recording as per section 8.5.3.12 , 8.7 8.11 of the D Book.	Reg	See the section ó4.6 DTR Functional Requirementsô below for details. Note Freeview will transmit CRID information, for a period of 8 days, in $EIT_{schedule}$	
6.9	TDT / TOT	The DTR shall have a real time clock / calendar running continuously. The clock shall be updated by the incoming TDT and TOT table in the SI. The DTR shall display the local time.	Req	EN 300 468 Alternatively the DTR may perform a 'DST' Computation to calculate the local time	
7.0	**Copy Protection**				

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
7.1	Digital Outputs	The DTR shall always provide HDCP digital content protection on the optional HDMI output. Any interface that can transmit high definition video via IP such as Ethernet and 802.11, IEEE 1394 (Firewire) and USB connections must use DTCP copy protection or other suitable method so that the HD content cannot be viewed or copied when connected to any other device.	Opt	Initially this is specified for the protection of HD content on external HDDs Content protection is not required for SD content	
8.0	**Set-up and I/O**				
8.1	Easy to use and simple documentation	DTRs shall be simple to set up and operate and be provided with clear easy to understand user documentation in line with that requirement. D-Book Section 26.	Req		

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
8.2	Support package	The following peripheral items should be included within a baseline DTR package: ♦ An RF lead/cable for connection of loop-through connector from output of first tuner into the RF input of second tuner (male F-Type connectors each end). ♦ Composite (CVBS) and stereo audio RCA cable. (1m min length) ♦ Component video and stereo audio RCA cable(s) (1m min length) ♦ HDMI Cable ♦ OPT cable (1m min length, secure fixing type, fully connected; internal screening on appropriate connections. EN 50049); ♦ Remote control and batteries ♦ An easy to understand user manual in English language.	Req Req Opt Opt Opt Req Req		
8.3	Status	A basic status check may be invoked by a menu driven option or a user selected key. The OSD is to present the reception quality, signal strength indicator, Channel ID and Video and Audio PIDs	Opt		
9.0	**Outputs**				
9.1	Primary output	RCA (phono) providing: Component YPbPr	Req	Shall meet the characteristics in ITU report 624-4	
9.2	Secondary output	RCA (phono) providing composite (CVBS) video	Req	Shall meet the characteristics in ITU report 624-4	
9.3	Secondary output	TV SCART with both composite (CVBS) and RGB or YPbPr.selectable Audio output (L,R). SCART shall support widescreen switching on pin 8.	Opt	EN 50049-1	

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
9.4	Secondary Output	HDMI	Opt	If fitted shall upscale to 1080i and be user selectable	
9.5	Phono Audio	Audio left & Right	Req		
9.6	Dolby Digital	SPDIF for pass through of Dolby Digital (AC-3). Either an Optical and / or Coaxial Digital Audio Output(s) Optical Digital Audio, or Dolby AC-3 bit stream output	Opt Opt Opt Opt		
9.7	UHF Modulator	RF Connector ï 75 ohm, IEC 169-2, Male/Female Frequency ï 470 to 860 MHz TV Standard PAL BG/I/DK Preset Channel ï 22 Tuneable to UHF channels 21 to 69	Opt		
9.8	IF loop-through	Satellite IF Loop through	Req		
9.9	IP connection	RJ 45 (Ethernet IEE802.3)	Req	The DTR shall have an Ethernet connection to support any future two-way IP based connectivity.	
9.10	Data Interface	The DTR shall have a data interface to perform software upgrades and should comply to one of the following options;- An RS232 connector 9 pin D sub Universal Serial Bus RJ 45 (Ethernet IEE802.3) Memory Stick	Req		

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
9.11	Remote Control	A Remote Control is to be supplied with the DTR. It is suggested that the remote control should follow D-Book chapter 25. The basic key functions and button labels should be as drawn below.  Note: this is not a recommended layout.	Req	The EPG button will launch the MHEG-5 EPG application. The TEXT button will launch the MHEG-5 Digitext application when broadcast. The RED button will launch any available MHEG-5 Interactive application.	

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
10.0	**Maintenance & upgrade** **Summary**	To allow for software changes in either, DTRs must be upgradeable in a practical manner, i.e. over-air download. The process of upgrading should cause minimal disruption to the viewer. However, to minimise the diversity of deployed software builds and to most efficiently use the available broadcast capacity, the DTR must detect and act upon the broadcast of a relevant software download within 24 hours of its transmission commencing.			
10.1	Auto-upgrade	DTRs shall be capable of automatic (i.e. not user initiated) software upgrade by over-air download with minimal interruption to the viewer and within 24 hours of availability of the download under normal operating conditions.	Req		
10.2	Download mechanism	Support for the use of DVB SSU, to at least the simple profile as defined in ETSI TS 102 006 is required.	Req		
10.3	Downloads in any carrier signal.	DTRs shall be able to handle the presence of software downloads in any NIT referred carrier signal.	Req		
10.4	Middleware	A compliant MHEG 5 UK Ver 1.06 profile plus the platform identification; Maori character extensions; EPG Key; and DTR additional extensions as detailed in section 6.	Req		
11.0	**Compliance**				
11.1	DVB	ETSI standards as listed in the relevant sections of this specification and the DTH Freeview Transmission Rules document.	Req		
11.2	Freeview NZ	Compliance with DTH Freeview Transmission Rules document ï including DTR extensions.	Req		
11.3	Energy standards	A new Australian and New Zealand energy standard for digital television DTRs is currently being drafted. DTRs will need to comply with this standard once ratified.	Req	Manufactures to state DTR power consumption in normal operating mode and standby mode.	

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
11.4	EN55013	EMC emissions broadcast DTRs	Req		
11.5	EN55020	Broadcast DTR product immunity	Req		
11.6	EN60065	Safety for mains operated domestic electrical equipment	Req		
11.7	EN6100-3-2	Harmonic current emissions	Req		
11.8	EN6100-3-3	Emission voltage fluctuations and flicker	Req		
11.9	EN6100-4-2	Immunity to ESD	Req		
11.10	EN6100-4-4	Immunity to fast transients	Req		
11.11	EN6100-4-5	Immunity from surge	Req		
11.12	EN6100-4-11	Immunity to voltage dips and interruptions	Req		

© Freeview Limited

4 Key Elements of Software

A number of software elements, in addition to those required for basic services will need to be available or developed prior to launch. They are:

4.1 EPG

An 8-day EPG service will be broadcast on all Freeview multiplexes as an MHEG-5 application. The MHEG-5 application will enable the user to navigate through all platform services. The user experience should be consistent across all DTRs (see DTR functional requirements in section 4.6.) In addition to the MHEG EPG, there will be EIT_schedule that will carry CRID information within a Content identifier descriptor to enable DTR series link recording as per section 8.5.3.12, 8.7 and 8.11 of the D Book.

4.2 Subtitles

According to EN 300 743 v1.3.1ï Digital Video Broadcast (DVB); Subtitling Systems.

4.3 Interactive Services

These services will be developed utilising MHEG-5 V1.06 applications

4.4 Software Upgrades

A service for providing firmware updates to DTRs will be available on the home transport stream using the DVB specification for SSU.

4.4.1. All conforming DTRs shall be capable of a systems software update using the simple profile defined in ï ETSI TS 102 006.

4.4.2. Manufacturers shall ensure that the DTR offered shall only respond to a unique OUI code, (Organisation Unique Identifier). This means that the DTR offered shall not react to any other OUI from any other manufacturer nor react to any other OUI from the same company which relates to a different model DTR.

4.4.3. The default DVB-SSU mode for DTRs shall be with DVB-SSU ñenabledò

4.4.4. For Conformance testing manufacturers will be required to deliver two ASI transport streams containing relevant converted binary image files, together with all relevant NIT and PMT data

necessary for their DTR to properly undergo a successful DVB-SSU operation. One stream will replace the software in the DTR as demonstrated by a new version number, or some other visible indicator, the other will restore the DTR to its then current configuration. Please refer to section 6 of the ñTransmission Rules For Freeview DTH Networkò document for further details.

4.5 Logical Channel Numbering

The logical channel numbering specification used is based on the Australian and French variation to the UK specification. For more information see ñTransmission Rules For Freeview DTH Networkò document

5 Region Service Functionality

5.1 Background

TVNZ transmits multiple versions of its channels in order to provide regional advertising, since revenues can be enhanced per hour of programming by selling the same time slot more than once to different advertisers who target different geographic regions. The Freeview/DTH satellite service intends to at least replicate the capability to deliver separately to the four geographic regions to which TVNZ currently deploys its terrestrial analogue advertising. Over time other Freeview broadcasts may also wish to utilise this regional functionality to target services to specific geographic locations.

The Service Information associated with all channels will be designed to allow identification of the region for which they are intended. Receivers will be set up on installation with a code that enables the delivery of the appropriate set of regional services for its location. This will entail the use of DVB-BAT tables.

5.2 The Technology

The DVB standards provide for this functionality routinely within the set of data tables that can be broadcast along with the video and audio signals. The relevant tables for this purpose are called ñBouquet Association Tables (BAT)ò. The concept to be adopted here is simply the creation of a separate bouquet for each different geographic region within the Freeview service.

5.3 The Process

When a new Freeview receiver is turned on, the viewer will be presented with an attractive screen on their TV set which asks, ñWhere are you?ò. The viewer will choose from the following list of place names that is displayed on their TV set to indicate where they are located. By choosing one of these places they will effectively configure their receiver to receive the associated bouquet of channels. The list of place names in the general order from north to south of New Zealand is;

Northland
Auckland
Waikato
Rotorua
Bay of Plenty
Taupo

© Freeview Limited

Gisborne
Napier
Hastings
Taranaki
Wanganui
Manawatu
Wairarapa
Wellington
West Coast
Canterbury
Southern Lakes
Otago
Southland

Whichever of these place names is selected by the viewer, that selection will then cause that particular receiver to relate to just one regional bouquet.

The regions are known as;

Auckland
Waikato
Central
Wellington
Christchurch
Dunedin

If the viewer moves house, or for any other reason wishes to become part of another viewing region, the flexibility will exist to enable the viewer to make that change.

5.4 The Detail

5.4.1 Bouquets

Place Names	Bouquet Name	Bouquet ID (HEX)	Bouquet ID (Decimal)
Northland	Auckland	1000	4096
Auckland	Auckland	1000	

© Freeview Limited

Waikato	Waikato	1100	4352
Rotorua	Waikato	1100	
Bay of Plenty	Waikato	1100	4608
Taupo	Waikato	1100	
Gisborne	Central	1200	
Napier	Central	1200	
Hastings	Central	1200	
Taranaki	Central	1200	
Wanganui	Central	1200	
Manawatu	Central	1200	
Wairarapa	Wellington	1300	4864
Wellington	Wellington	1300	
West Coast	Christchurch	1400	5120
Canterbury	Christchurch	1400	
Southern Lakes	Dunedin	1500	5376
Otago	Dunedin	1500	
Southland	Dunedin	1500	
	Region 7	1600	5632
	Region 8	1700	5888
	Region 9	1800	6144
	Region 10	1900	6400
All Free Channels	All FTA	2000	8192

Each Bouquet region will need to be able to accommodate up to 45 services or channels within its bouquet.

The bouquet regions 7 ï 10 are specified for future potential growth activities and will be spare at the launch of Freeview.

Bouquet Region 11 is specified for those few viewers who will insist upon having the full viewing flexibility of DVB compliant receivers, where they will be able to view all FTA programme streams.

© Freeview Limited

5.4.2 Button Assignments (on remote control units)

In general the button numbers of FTA receiver RCUs directly relate to the position of a channel within the channels list of the receiver. The channel at the top of the list will normally be tuned by the receiver when button ñ1ò on the RCU is selected.

In a totally unmanaged digital FTA satellite environment, the position of a channel within the list of channels contained in a single carrier, or transponder, will be determined solely by the value of its ñService IDò. The sequence in which individual carriers or transponders are scanned will determine the relative listing sequence of all of the channels within that carrier relative to any other carrier.

For example; say there are two satellite carriers with channels shown viz;

Carrier One:

TVONE	ï	Service ID 001
TV2	-	Service ID 002
TV3	-	Service ID 003

Carrier Two:

MTS	-	Service ID 001
DWTV		Service ID 002
Prime	-	Service ID 003
CCTV9	-	Service ID 004

In an unmanaged FTA digital satellite environment, if Carrier One was scanned first and then Carrier Two, the buttons of the associated receiver RCU would be as follows;

TVONE	-	button 1
TV2	-	button 2
TV3	-	button 3
MTS	-	button 4
DWTV	-	button 5
Prime	-	button 6
CCTV9	-	button 7

© Freeview Limited

If Carrier Two was scanned first and then Carrier One, the buttons of the associated receiver RCU would be as follows;

MTS	-	button 1
DWTV	-	button 2
Prime	-	button 3
CCTV9	-	button 4
TVONE	-	button 5
TV2	-	button 6
TV3	-	button 7

Most non-Freeview approved FTA receivers currently available enable the viewer to manage the button assignment via the use of a ñFavouritesò menu option, whereby the viewer can delete unwanted channels or services, and then re-order the sequence of channels so that particular channels will appear with particular RCU buttons.

The Freeview/ DTH satellite service will, in this context, be a managed service. The DVB SI (service information) system that will be used will provide the necessary level of ñchannels-to-RCUò button assignment control via use of logical channel number descriptors.

The logical channel numbering specification used is based on the Australian and French variation to the UK specification. For more information see ñTransmission Rules For Freeview DTH Networkò document

5.5 Summary

The Freeview/ DTH satellite service will provide a Regional Service capability for its participating broadcasters based upon the existing six geographic regions deployed by TVNZ, with limited scope for additional regions to be added at some future time. The viewer or installer of participating FTA receiver products will identify the geographic region that is to be associated with each receiver at time of the initial power-up of the STB. Once set this process will not need to be repeated, but in the event that the receiver is relocated to another region, a setup menu option will exist which will enable the relevant geographic region to be re-defined.

© Freeview Limited

6 NZ MHEG-5 extensions to MHEG-5 UK Profile v1.06

6.1 Purpose

This section provides the detailed specification of the MHEG-5 engine required in compliant digital TV receivers. This specification defines ñapplication domainò in the terms set out in Annex D of ISO/IEC 13522-5.

This document defines the following ñapplication domainò

- ñNZProfile1ò

6.1.1 Scope

As far as is practical this document does not intend to create new specifications. Where possible existing public standards/specifications are referenced and if required profiled.

6.2 Specifications

Unless stated otherwise specifications follow those in [MHEG]. For the avoidance of doubt these specifically include:

- Content data encoding
- Application defaults

Note: No features specified in [MHEG] are removed or modified so as to fail conformance tests defined for [MHEG]. This section specifies additions to [MHEG]. Some features (e.g. additional characters) require invocation by the MHEG application before they become active. For example, additional characters require attributes to be set in the application. Without such activation the receiver shall conform to [MHEG] and shall pass the conformance tests specified for [MHEG].

6.2.1 Miscellaneous

This clause provides specifications that may be used in one or more of the extensions packages.

6.2.2 Platform identification

6.2.2.1 UniversalEngineProfile GetEngineSupport feature string

The UniversalEngineProfile (UEP()) GetEngineSupport feature string is defined in [MHEG]. It allows version information about the platform to be interrogated. This clause extends this behaviour allowing the ñinternational profile stringò (see Table 3-1, ñList of international profiles,ò on page 15) for each of the international profiles that the receiver supports to be interrogated in addition to those defined by [MHEG].

6.2.2.2 WhoAmI resident program

The WhoAmI (WAI()) resident program is defined in [MHEG]. It returns a string that contains a space separated set of sub-strings. This clause extends this resident program so that the string returned contains additional space separated sub-strings. The additional sub-strings are the ñinternational profile stringò (see Table3-1, ñList of international profiles,ò on page 15) for each of the international profiles that the receiver supports.

© Freeview Limited

6.3 Character set extensions

The text in this section has been generalised with the goal of allowing the specification to address multiple markets and allowing receivers to be developed to address multiple markets.

The base set of characters that all receivers shall support is defined in [MHEG]. [MHEG] also specifies how text is encoded, stored, processed and presented. This clause provides additional specifications that enable packages of characters to provide support for additional regions/languages/peoples.

Unless stated otherwise all aspects of text storage and presentation follow the specifications in [MHEG]. For the avoidance of doubt these specifically include:

- Character encoding
- CharacterSet attribute
- Required sizes and styles
- Control of text flow
- Text rendering
- Text mark-up
- EntryFields
- HyperText
- Character repertoire

6.3.1 Maori character extensions

This package provides macronised vowels to support characters in the Maori alphabet.

6.3.1.1 Font

Receivers shall implement this package of characters using one of the following fonts:

Tiresias V7.51 (NZ) from Bitstream Inc (www.bitstream.com).

6.3.1.2 Character encoding

Text shall be encoded as in [MHEG] (UTF-8).

6.3.1.3 Invocation

This package of additional characters shall become available to MHEG applications in text objects that have attributes set as specified Table 2-1, ñInvocation of Maori character set packageò

Attribute name	Value	Comment
Font	ñrec://font/nz1ò	
ContentHook	As [MHEG]	UTF-8 encoding is used as specified in [MHEG]
CharacterSet	11	The character repertoire is a specific superset of that defined in [MHEG]

© Freeview Limited

TABLE 2-1: Invocation of Maori character set package

Note: These attributes can be set in a variety of ways. For example, the attributes can be set globally on the application object or locally on a text object. Suitable setting of attributes enables all of the following scenarios:

- All text objects conform to [MHEG]
- All text objects can use the extensions defined in this package
- Some text objects conform to [MHEG] and others can use the extensions defined in this package

6.3.1.4 Rendering rules

When rendering this package of additional characters receivers shall use the layout and rendering rules defined in [MHEG].

Receivers shall support all of the font sizes specified in [MHEG].

6.3.1.5 Character repertoire

This package of additional characters requires that receivers shall implement the set of characters listed in Table 2-2, ñCharacter additions for Maoriò in addition to those defined in [MHEG].

UCS2	UTF8	Glyph	Unicode Name For Character
0100	C480	ă	Latin Capital Letter A With Macron
0101	C481	Ũ	Latin Small Letter A With Macron
0112	C492	ĕ	Latin Capital Letter E With Macron
0113	C493	Ủ	Latin Small Letter E With Macron
012A	C4AA	Ō	Latin Capital Letter I With Macron
012B	C4AB	ō	Latin Small Letter I With Macron
014C	C58C	æ	Latin Capital Letter O With Macron
014D	C58D	Ø	Latin Small Letter O With Macron
016A	C5AA	ì	Latin Capital Letter U With Macron
016B	C5AB	Î	Latin Small Letter U With Macron

TABLE 2-2: Character additions for Maori

6.4 User input extensions

The base set of user input keys that all receivers shall support is defined in [MHEG]. This clause specifies additional packages of UserInputEventData values, User Input registers and EngineEvents.

© Freeview Limited

6.4.1 EPG key

6.4.1.1 UserInputEventData value

The EPG key shall generate UserInputEventData value 300.

6.4.1.2 UserInput registers

In addition to the input registers defined in [MHEG], receivers shall support the following input registers: All three input registers (13, 14 and 15) must be supported.

UserInput EventData value	Function Name	Register Number		
		13	14	15
1	Up		□	□
2	Down		□	□
3	Left		□	□
4	Right		□	□
5-14	0,1,2,3,4,5,6,7,8,9 respectively		□	
15	Select		□	□
16	Cancel / Exit	□	□	□
100	Red	□	□	□
101	Green	□	□	□
102	Yellow	□	□	□
103	Blue	□	□	□
104	Text	□	□	□
300	EPG	□	□	□

TABLE 2-3: Input registers EPG key

6.4.1.3 EngineEvents

EventData		Notes
Name	Value	

© Freeview Limited

EventData		Notes
Name	**Value**	
EPGKeyFunction	300	Generated when the user activates the EPG key and there is an active scene object. This event is raised independently of the InputEvent register selected at the current moment or whether any interactible has the InteractionStatus of True. If a key press causes both the EngineEvent and the UserInput event then the EngineEvent shall be raised first.

TABLE 2-4: EngineEvents

6.5 PVR extensions

This clause specifies a package of extensions that are used for controlling Personal Video Recorders (PVR), this is identified as the *PVRExtension*.

6.5.1 Implementation

Receivers implementing the *PVRExtension* package shall follow the requirements for [D-Book] and for [DTG DTR], but note that referencing programme events by EIT event_id (as described in [D-Book] clause 8.11.1.1) is not supported by this package. Instead all events in EIT shall include a Content Identifier Descriptor that, in conjunction with a Default Authority Descriptor, provides a CRID for the event.

6.5.2 GetEngineSupport feature string

Receivers implementing this package shall return ñTRUEò to the Engine Support String ñPVR(n)ò, where n = 0.

6.5.3 EngineEvents

EventData		Notes
Name	**Value**	
PVRChangedEvent	20	Generated when the list of events to be recorded by the PVR changes. Possible reasons for changes include but are not limited to: • event recorded, • event cancelled due to conflict, • event added or removed through the PMB or PCB ResidentPrograms

TABLE 2-5: EngineEvents

© Freeview Limited

6.5.4 Resident programs

Receivers implementing this package shall support the following Resident Programs.

6.5.4.1 CRID format

CRIDs carried in SI may be defined in such a way that the Scheme and Authority parts are carried once only if they are common to a group of CRIDs. However the format for CRIDs passed across the MHEG PVR API in any of the following Resident Program calls shall include the Scheme and Authority parts in all cases.

A CRID that does not include an instance identifier shall be in the format:

Scheme + Authority + Unique Identifier

A CRID that includes an Instance Identifier shall be in the format:

Scheme + Authority + Unique Identifier + # + Instance Identifier

Examples of CRIDs with and without Instance Identifiers follow:

crid://company.tv/123df5

crid://broadcaster.com/hef5w#e1

As specified by [DTG DTR] CRIDs carried in SI are case insensitive. However, MHEG-5 operations on strings are case sensitive. So:

- the following Resident Programs shall be case preserving
- operations relative to broadcast SI shall be case insensitive

6.5.4.2 PVR_MakeBooking

Adds an event to the PVR schedule.

Synopsis PMB(crid, cridType, name, description, result)

in/out/ in-out	type	name	comment
in	GenericOctetString	crid	
in	GenericInteger	cridType	The type of CRID being referenced, where: • 49 (0x31) is a programme event • 50 (0x32) is a series event
in	GenericOctetString	name	A descriptive name for the event
in	GenericOctetString	descrip-tion	A brief description of the event

© Freeview Limited

in/out/ in-out	type	name	comment
out	GenericInteger (shall provide an indirect reference to an IntegerVariable)	result	The result of the operation: 0 = booking successful 1 = alternate instance booking successful -1 = conflict with a previous booking -2 = CRID not found -3 = CRID already booked for recording -4 = booking cancelled by user -5 = booking failed for other reason -6 = booking failed due to insufficient space -7 = booking failed due to too many bookings

TABLE 2-6: Arguments

Description The Resident Program adds an event to the PVRõs list of scheduled events to record. The type of CRID can be any of a single programme or series ï the type is defined in cridType to aid the PVR in finding the required CID. Where the CRID is a series CRID the booking relates to all programme events that are part of the series.

The PVR is required to validate the CRID and check that resources are available for the booking. This may involve searching for multiple instances of an event until one is found that does not clash with a previous booking. Where no such instance is found the PVR may choose to indicate the conflict to the viewer, giving them the option to cancel one or more of the bookings.

Where the instance chosen to record (either automatically or by user intervention) is not the (temporally) first instance found the call shall return with a result value of 1.

The name and description can be used by the PVR to describe the event when it is placed in the booking list.

6.5.4.3 PVR_CancelBooking

Removes an event from the PVR schedule.
Synopsis PCB(crid, cridType, result)

in/out/ in-out	type	name	comment
in	GenericOctetString	crid	
in	GenericInteger	cridType	The type of CRID being referenced, where: • 49 (0x31) is a programme event • 50 (0x32) is a series event

© Freeview Limited

in/out/ in-out	type	name	comment
out	GenericInteger (shall provide an indirect reference to an IntegerVariable)	result	The result of the operation: 0 = booking removed -1 = the event is being recorded -2 = CRID not found -3 = the event has already been recorded

TABLE 2-7: Arguments

Description This resident program removes the requested event from the list of events currently booked for recording. The event is referenced by its CRID, along with the CRID type.

Cancelling a series CRID will cause all future events in the series to be ignored, in addition to ones currently visible in the schedule.

6.5.4.4 PVR_ListBookings

Returns a list of CRIDs and CRID types currently being monitored.
Synopsis PLB(crids_and_crid_types)

in/out/ in-out	type	name	comment
out	GenericOctetString (shall provide an indirect reference to an OctetStringVariable)	crids	A space separated list of full CRIDs currently being monitored.

TABLE 2-8: Arguments

Description The Resident Program returns an OctetString carrying a list of the currently valid bookings. The format for each booking shall be a CRID followed by CRID type. A single space (0x32) character separates each CRID and CRID type. A single space (0x32) character separates each booking.

The list shall contain all currently valid bookings previously added using the PMB Resident Program. There shall be no duplicate bookings in the list. In each booking the CRID and CRID type shall be in the format that was used when the booking was created using the PMB Resident Program. The order of bookings in the list is not defined. Bookings that are no longer valid because they have lapsed or have been successfully recorded or have been removed by other means shall not be present in the list.

An example of the OctetString returned from the PVR_ListBookings call describing one programme CRID and one Series CRID is as follows:

"crid://service1.tv/4df6a2 49 crid://service1.tv/news 50"

© Freeview Limited

6.6 Regionalised broadcasts

1. The receiver shall, on first boot and/or as a viewer requested option, present a list of available regions as defined within the broadcast Transport Stream signalling and allow the viewer to select the region in which they are located. Once selected, the receiver shall present to the viewer only those services that are broadcast as part of the selected region. All services broadcast in the Transport Stream that are not defined as part of the currently selected region shall be hidden from the viewer. This is the basis of the proposed extension to include additional regional functionality as required within the New Zealand Freeview

2. Request for Service Index given a service reference

Calls to the SI_GetServiceIndex ResidentProgram shall return a non-negative integer when the following are true:

1. The referenced service is signalled in the Bouquet Association Table for the currently selected region,

   AND

2. the running status of the referenced service, defined in the Service Description Table, is either ñrunningò or ñundefinedò

If either of the above requirements is not met the ResidentProgram shall return a ServiceIndex value of -1.

© Freeview Limited

6.7 Profiles

This clause identifies the features specified in section 2.0, ñSpecificationsò that a receiver must implement (in addition to the requirements specified in [MHEG]) to implement a particular profile. Note that OPT defines a normative option.

Profile Ref. Number	Profile name	Version	International profile string[1]
1	UK MHEG		
2	New Zealand Freeview 1	001.000.000	INT002001000000

TABLE 3-1: List of international profiles

6.8 Requirements of profiles

This clause tabulates the requirements for each profile.

Specification clause	Requirement
2.1.1, ñPlatform identificationò	□
2.2.1, ñMaori character extensionsò	□
2.3.1, ñEPG keyò	□
2.4, ñPVR extensionsò	Optional
2.5, ñRegionalised broadcastsò	□

TABLE 3-2: Profile requirements for New Zealand Freeview 1

1. Receivers that support a profile shall return the feature string as part of the value returned by the WhoAmI resident program and shall return 'true' when the feature string is tested using the UniversalEngineProfile resident program.

© Freeview Limited

7.0 DTR Functional Requirements

7.1. Overview

The DTR functions as specified in 4.6.2 below are modelled on those in the ôDTG functional specification for Digital TV recordersô as used for ôFreeview Playbackô in the UK. It expands on these functions so as to specify the minimum booking, recording, and playback functions required for a conformant Freeview NZ DTR. It specifies which functions will be presented to the user as part of the MHEG-5 EPG application, the interaction between the EPG and the DTR, and which functions are required to be performed by the DTR itself.

In the following sections a number of references to ñRecording Listò and ñPlayback Listò are made. The Recording List is the list of programmes or series that have been booked for recording but that has not yet been recorded. The Playback List is the list of content that has already been recorded or is in the process of being recorded (the manufacturer is free to decide if these are presented as two separate lists or one combined list in their user interface design).

© Freeview Limited

7.2. DTR Functions

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
1	**Programme bookings**				
1.1	Book	The EPG shall handle the booking of a programme and send a ëDTR_make bookingô instruction to the DTR. The DTR shall return a return code to the EPG according to the success or failure of the operation, as described in Section 6. This information may be used to inform the user of the outcome via the EPG.	Req	Any successful booking made via the EPG shall indicate success via an onscreen icon [R] against that programme listing.	
1.2	Cancel	The EPG shall handle the cancellation of a previously booked programme by sending a ëDTR_cancel bookingô instruction to the DTR. The DTR shall return a return code to the EPG according to the success or failure of the operation, as described in Section 6. This information may be used to inform the user of the outcome via the EPG.	Req	The EPG shall display a ñare you sure you want to cancel this programme booking?ò dialog before the ëcancel bookingô instruction is sent. For a successful cancelled booking the EPG shall indicate success by no longer displaying the onscreen icon [R].	
1.3	List	A successful programme booking shall be listed in the Recording List until the time at which the programme has started recording. At the time of recording the entry shall be removed automatically from the Recording List and an entry shall be made in the Playback List. Once in the Playback List all information about the programme shall be obtained from EIT p/f.	Req		

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
2	**Series bookings**				
2.1	Book	The EPG shall handle the booking of a programme that is also part of a series. If the viewer books a programme that is also part of a series the EPG will present them with a dialog that will allow them to make the choice between recording the programme only and recording the series only. The EPG will then send a ôDTR_make bookingô instruction to the DTR. The DTR shall return a return code to the EPG according to the success or failure of the operation, as described in Section 6. This information may be used to inform the user of the outcome via the EPG.	Req	Any successful series booking made via the EPG shall indicate success via an onscreen icon [S] against all programmes in that series. If a programme that is part of a series has already been booked for recording (i.e. not as part of the series) and this is subsequently rebooked as a series the original programme booking shall be removed from the booking list automatically and the series used instead. This logic shall be handled entirely by the DTR meaning the EPG shall NOT need to send a Cancel Programme message before sending a Book Series message to the DTR. The process of booking the series shall automatically cancel the previously made programme booking. For the initial version of the profile each programme may be signaled as being in zero or one series only (i.e. a programme cannot be part of two different series). As specified in [DBook] section 8.7.2.1 Series Recording ï the DTR is expected to store and track a series for up to 13 weeks between occurrences and then discard it.	

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
2.2	Cancel	The EPG shall handle the cancellation of a previously booked series by sending a ódDTR_cancel bookingô instruction to the DTR. This will cancel the series booking. The DTR shall return a return code to the EPG according to the success or failure of the operation, as described in Section 6. This information may be used to inform the user of the outcome via the EPG.	Req	The EPG shall display a õare you sure you want to cancel this series booking?ö dialog before the ócancel bookingô instruction is sent. For a successful cancelled booking the EPG shall indicate success by no longer displaying the onscreen icon [S].	
2.3	Display	The display of programmes selected for recording shall include an indication if the programme is included as a consequence of being one programme in a series.	Req		
2.3	List	A successful series booking shall be listed in the Recording List and shall remain in the Recording List after each programme in the series is recorded. At the time of recording each programme in the series an entry shall be made in the Playback List for that programme and all programme information shall be obtained from EIT p/f. The Recording List entry for the series shall be removed automatically after a period of 13 weeks in which no programme from the series has been found.	Req		

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
3	**Alternate Instance bookings**				
3.1	Book	If a booking is made that causes a conflict, the requested booking shall be checked for alternate instances. If an alternate instance is available that enables the requested programme or series to be recorded at another time this shall be used instead of the selected instance of the programme or series. An ñAlternate instance bookedò return code shall be passed back to the EPG. If the alternate instance conflicts and no further alternate instances of this event are available the requested booking shall fail and the DTR shall present a conflict resolution dialog. This shall occur subject to any device limitations (e.g. available space). Note: Previously booked programmes or series (that are causing the conflict) need not be checked for alternate instances. Alternate instance bookings shall be available for programme and series bookings.	Req	When a conflict is found for a requested booking the DTR shall check for an alternate instance that does not conflict and an ñalternate instance bookedò return code shall be passed back to the EPG. The EPG shall then display a warning to the viewer that although the event has been booked it may actually be recorded at a different time to that selected in the EPG. The EPG shall indicate that the alternate instance programme is to be recorded via an onscreen icon [R] (for programme bookings) or [S] (for series bookings) against that programme listing.	
3.2	Cancel	The cancellation of a previously booked programme that happens to have been booked as an alternate instance shall be handled the same as a programme booking cancellation.	Req	For a successful cancelled booking the EPG shall indicate success by no longer displaying the onscreen icon [R] or [S] as appropriate.	

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
4	**Split Event bookings**				
4.1	Book	A programme may consist of multiple events (for example, a movie divided into two parts by another programme). Split events shall be handled in the same way as standard programme bookings. No special message is required. All segments of the event shall be highlighted as being booked in the EPG.	Req	If a programme entry exists in the schedule twice as a complete programme and as a split event these shall be considered to be the same content and may be considered when conflict occurs and an alternate instance is available.	
4.2	Cancel	The EPG shall handle the cancellation of a previously booked programme by sending a ôDTR_cancel bookingô instruction to the DTR. The DTR shall return a return code to the EPG according to the success or failure of the operation, as described in Section 6. This information may be used to inform the user of the outcome via the EPG.	Req	The EPG shall display a ñare you sure you want to cancel this programme booking?ò dialog before the ócancel bookingô instruction is sent. For a successful cancelled booking the EPG shall indicate success by no longer displaying the onscreen icon [R] or [S] as appropriate.	
4.3	Playback	Split events when recorded shall be stored as separate entries to enable the viewer to start watching the programme from the start of any part. Each part shall be linked so that when the viewer plays them back in sequence they do not have to manually select the subsequent parts.	Req		

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
5	**Recommendations bookings**				
5.1	Book	The EPG shall handle the booking of a programme that includes recommendations. If the user books a programme that includes recommendations the EPG will present them with a dialog that offers them the choice of booking the recommended programme(s) and the requested programme or just the requested programme. If the user agrees to book a recommendation that is a series the DTR should book that series. If a recommended programme or series includes alternate instance information, this shall be used to minimise any conflicts. The EPG will then send a ôDTR_make bookingô instruction to the DTR for each programme or series listed as a recommendation as well as the requested programme booking. The DTR shall return a return code to the EPG according to the success or failure of the operation, as described in Section 6. This information may be used to inform the user of the outcome via the EPG.	Req	Any successful booking made via the EPG shall indicate success via an onscreen icon [R] or [S] (depending on whether it is a programme or series booking) against that programme listing. Recommendations are simply ways of linking programmes in scope of the current EPG. Recommended programmes and series are therefore booked in exactly the same manner as standard programmes and series and they must therefore adhere to the same rules as standard programmes and series. A recommended programme must exist in the scope of the current EPG. A recommended series must include at least one programme in that series in scope of the current EPG. Recommendations shall not be self referential so shall not reference either the current Programme or the current Series. It shall be possible to recommend another programme AND the series in which that programme is included as long as the recommended series does not also include the current programme. The programme only or the series only shall be booked using the logic described in 2.1.	

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
5.2	Cancel	The EPG shall handle the cancellation of a previously booked programme by sending a õDTR_cancel bookingô instruction to the DTR. The DTR shall return a return code to the EPG according to the success or failure of the operation, as described in Section 6. This information may be used to inform the user of the outcome via the EPG.	Req	The EPG shall display a õare you sure you want to cancel this programme booking?ò dialog before the õcancel bookingô instruction is sent. For a successful cancelled booking the EPG shall indicate success by no longer displaying the onscreen icon [R] or [S] as appropriate.	
5.3	Conflict	If a booked programme also includes recommendations the programme booking shall be made first and any conflict resolution performed. Each recommended programme or series booking shall then be made one at a time as separate bookings. Conflict resolution shall be performed on each as it is booked. It is therefore possible to book a complete list of recommendations or a partial list only if some of the listed programmes conflict with previously made bookings. All recommendations are therefore handled in the same way as individual programme or series bookings. A maximum of 5 recommendations per programme shall be defined. If a recommended programme or series also contains recommendations these shall not be followed. The first level of recommendations for each programme shall be followed only.	Req		
5.4	List	Since recommendations are booked in the same manner as standard programmes or series no special indication that they were booked or subsequently recorded via a recommendation is required.	Req		

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
6	**Conflict Resolution**				
6.1	Back to back bookings	The DTR shall be able to record back-to-back programmes on the same service without registering this as a conflict.	Req		
6.2	Displaying a conflict	A conflict which is detected at the time of making a booking shall be indicated immediately, together with details of the cause, so that the user can take appropriate action.	Req	All conflict resolution shall be handled via the DTR GUI. The EPG shall therefore never receive a ñconflictò return code as these must always be handled through the DTR by cancelling one or more bookings.	
6.3	Default action	The default action taken by the DTR (with no user interaction) shall be made clear to the user in the manual. It is recommended that should the user not respond to a conflict resolution request that any scheduled recordings take precedence over viewing of a service or an OTR. There shall be a mechanism for informing the user of failed or incomplete recordings (in the playback list).	Req		

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
7	**One Touch Recording (OTR)**				
7.1	Record	The recorder shall incorporate a One-touch Recording (OTR) function which allows the user to start a recording, while watching live TV, with one button press on the remote control. The OTR button shall be the REC or ⏺ - record button on the RCU.	Req	The OTR button shall always be available to the viewer regardless of whether the EPG is active or not. When pressing the OTR button the standard OTR screen shall be displayed for a few seconds indicating that the current service is being recorded. The front panel shall indicate the recording state for the period of recording. If the EPG application is running it shall be stopped when the OTR screen is displayed. The EPG shall be available again via the EPG key after the temporary OTR screen has stopped being displayed.	
7.2	Duration	The duration of the recording operation shall be based on EIT p/f, subject to any device limitations (e.g. available space).	Req	If the DTR implements the optional live TV buffer/cache (see 8.2) then pressing the OTR button during an event will capture the portion of the event in the buffer/cache, provided that start of that event is in the buffer. The DTR will then record the remainder of the event, therefore capturing the entire event.	

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
7.3	Conflict	OTR shall not be delayed by further requests for user interaction unless to proceed would affect a recording that is either already underway or scheduled to start before the end of the OTR operation. If a conflict occurs when the OTR button is pressed a dialog shall be displayed in which the viewer may make the choice to cancel one of the conflicting programmes or partially record the OTR programme. If no choice is made the default action shall be to partially record the OTR programme. The same dialog shall be displayed if the OTR button is pressed and there is no immediate conflict but a schedule change means a conflict will now occur during the OTR period. The default action shall be to partially record the OTR programme stopping the OTR at the point at which the conflict occurs. The DTR shall indicate to the viewer the partially recorded state of OTR programme in the playback list. If an OTR event is a split event, each part of the split event shall be recorded separately.	Req		
7.4	Programme identification	The OTR function is event based and shall be controlled by EIT P/F. The 1st press of the OTR button records until the end of the current programme (including any end time off-set)	Req		

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
7.5	Continuous Recording	The OTR function may include an additional feature whereby a 2nd press gives 3 options ï Record current service to: 1. End of present programme (display name) 2. End of following programme (display name) 3. After Hours and Minutes (user entry) Thereby providing the user with a simple mechanism to record the present and following programme of the current service.	Opt		

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
8	**Pause and Rewind live TV**				
8.1	Pause	The user shall be able to pause live TV. It shall be possible to pause for at least 30 minutes, subject to any device limitations (e.g. available space) or recording conflicts.	Req		
8.2	Rewind	The user shall be able to rewind live TV. It shall be possible to rewind at least 30 minutes (but preferably one hour) on the service that is currently tuned-in. Chase playback should then be possible ï see 11.3	Opt	This implies that the DTR has a caching feature whereby the current service is constantly being recorded to the HDD in a 30 minute to one hour buffer. If the user changes services then the buffer is emptied of the old service content and the new service starts caching.	
8.3	On / Off	If 8.2 ócachingôis implemented it is also suggested that the user should be able to switch this feature on or off.	Opt	Default should be set to ónô	

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
9	**Accurate Recording**				
9.1	Start / Stop	The DTR shall incorporate a default mechanism for controlling the starting and stopping of a recording based on the broadcast EIT p/f.	Req	The DTR shall also allow the user to specify start/stop time off-set periods ï see 12.1. The default offset period should be 2 minutes before the start and 10 minutes after the end.ô	
9.2	Updated EIT p/f	The DTR shall track changes to the start time and end time of the event. The start of an event is indicated by its transition to the present event for the specified service. The end of an event is indicated by the event being replaced by a different event as the present event for that service. When the DTR is not in passive standby and a schedule change occurs, the affected programmes in the schedule of recordings and any recordings in progress shall be updated. In standby, the DTR shall monitor the EIT p/f sufficiently frequently and for sufficient duration to allow a programme to be recorded successfully even when the start time is brought forward by up to ten minutes and the schedule information is updated at least five minutes before the new start time. NOTE: Passive standby is defined as that state in which the DTR is inactive as far as the user is concerned and no broadcast signal is being decoded.	Req	It is permissible for a recording to start before the start of an event and to finish after the event, but must not create unnecessary conflicts with the requirement for a back-to-back recording capability. Note: Freeview broadcasters are not currently interfacing their presentation automation systems (on-air schedules) to the Freeview SI/EPG system. However this is a planned future enhancement and therefore conformant DTRôs are required to implement the accurate recording function.	

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
10	**Schedule of Recordings**				
10.1	Recording List	A mechanism for displaying programmes (and series) selected for recording shall be available, showing a minimum of scheduled date, programme (or series) title, service name, start time, and end time (or duration). The programme or series synopsis shall also be available via one RCU button press (preferably the ónfo or iôbutton.	Req		
10.2	Modifications	The DTR shall allow the user to delete a programme (or series) from the Recording list.	Req		
10.3	Information source	Programme and series title and synopsis are sent across the API from the EPG at the time of booking. While the scheduled date, service name, start time, and end time (or duration) shall be obtained from EIT Schedule and SDT. For series bookings the time of the next programme in the series shall be displayed. This mechanism shall include a default message if there are no events in scope of the booked series within the current schedule. The DTR shall regularly check EIT schedule for any update to the date/time information associated with each event in the Recording List and update the list to reflect the schedule.	Req		

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
10.4	Content recorded	The DTR shall be able to record at least the following essential signal components: a. The video (if a TV service) b. The audio, as selected by the user c. The subtitles, as selected by the user Where the components above are recorded separately, the user shall be able to switch them on or off during playback.	Req	On-screen informational messages or menus generated by the recorder shall not be recorded with the programme content.	
10.5	Recording in progress	The DTR shall indicate to the user when a recording is in progress via the front panel display of the DTR (not via OSD). The Recording list should also highlight a programme that is in the process of recording.	Req	This is to ensure that the user knows that the DTR is actively recording.	
10.6	Record and Replay	The DTR shall be capable of replaying one program and recording at least 2 programs simultaneously.	Req		
10.7	Update EPG	The DTR shall create an ñUpdateBookingListò Engine Event each time a change to the Recording List is made. Refer to Section 6 for details of this Engine event.	Req	This shall enable the EPG to update its screen if changes to bookings are made via the DTR rather than via the EPG.	

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
11	**Replay functions**				
11.1	Playback list	All information about each programme recorded shall be obtained from EIT p/f at the time of recording. This allows details of individual programmes to be obtained as they are recorded even if they were booked via a series booking. A mechanism for displaying recorded programmes shall be available, showing a minimum of date, programme title, service name, start time, end time (or duration), and whether this programme is part of a series booking. The playback list shall be ordered by date (default) with the option to re-order by programme name or viewed state. The programme synopsis and parental rating shall also be available via one RCU button press (preferably the ónfo or iôbutton.	Req		
11.2	Information source	The playback list shall always obtain the above information from the EIT p/f at the time of recording thus enabling details for individual programmes to be obtained even if booked as a series.	Req		
11.3	Chase Playback	The user shall be able to start the playback of a programme for which the recording has not yet completed.	Req		
11.4	Fast Forward and Reverse	Fast playback at speeds up to at least x16 shall be possible in both forward and reverse directions. At all speeds, the user shall be presented with a series of images taken from the video stream as they are passed.	Req	30 sec skip or other methods to completely skip advertisements shall not be allowed	

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
11.5	Parental Ratings	A parental rating shall be carried in EIT p/f. This shall be obtained by the DTR when populating details of a recording in the playback list. This shall be used to enable content locking such that a pass-code should be entered before the content may be viewed if the user's Parental Rating setting is lower than the programmes Parental Rating value. This shall be based on pre-set user preferences for parental control based on parental ratings codes.	Req	Service locking must be a function of the DTR as no additional signalling other than parental rating descriptors at the event level will be provided to enable this.	
11.6	Playback status	The playback list shall highlight if a programme has been viewed or not.	Req		

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
12	**Manual time off-sets**				
12.1	Start / Stop times	The DTR shall allow the user to set start and stop off-set time periods e.g. start 2 minutes before scheduled start time and stop 10 minutes after scheduled end time.	Req	This feature is especially important as Freeview broadcasters are not required to implement ‘accurate recording’ However as per the functional requirement for ‘accurate recording’ in 9.1 above, the DTR shall regularly monitor EIT p/f. In doing so it can use the ‘following’ (f) programme start time as the time from which it creates the start time off-set.	

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
13	**Recording Capacity**				
13.1	Capacity information	The recorder shall be equipped with a means of indicating the available recording capacity. The basis for the indication shall be explained in the instruction manual and shall be in terms of percentage or time, based on a notional capacity requirement per hour of recording.	Req		
13.2 A	Capacity Management	Option A: If insufficient space is available on the HDD to record the scheduled programme the viewer shall be told to make space immediately before the scheduled time of recording. This may or may not coincide with the time the booking is made. If a number of recommendations are booked, each shall be handled in the same way as an individual programme booking. If a split event is booked the required space shall be calculated at the start of the first segment. If it is not possible to book a programme due to insufficient space via the EPG the message shall be displayed by the DTR and this shall then pass a ñcancelledò message back to the EPG. If this option is implemented the ócapacity warningô function at 13.3 must also be implemented.	Req	Option A or Option B is required (not both).	

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
13.2 B	Capacity Management	Option B: If the HDD is full so that the next recording cannot be completed, the oldest recorded programme in the playback list shall be deleted to make space. This will continue until enough space has been made to record the next scheduled programme. If this option is implemented the ôkeep functionô at 13.4 must also be implemented.	Req	Option A or Option B is required (not both).	
13.3	Capacity Warning	A ôcapacity warningô function is required. This shall inform the user that they have reached 90% of the HDD available capacity and ïshould consider deleting some recordingsòto increase available space.	Req	If 13.2A above is implemented.	
13.4	Keep function	The viewer shall have the option to flag programmes to be kept regardless of the age of the recording. If all content is flagged to be kept and the HDD runs out of space subsequent recordings will fail.	Req	If 13.2B above is implemented.	

© Freeview Limited

Item No.	Resources	Reference/Detail	Notes		Manufacturers Response
14	**Runaway Recordings**				
14.1	EIT p/f	The recorder shall incorporate a mechanism for handling a runaway recording (e.g. as could occur if the EIT p/f transition fails because of a fault in the distribution network). If the EIT p/f now event extends for more than two hours beyond the scheduled duration then the recorder may terminate the recording at any time.	Req		
15	**Manual Time based Recording**				
15.1	Manual Record	The DTR shall have a time based ómanualô record feature which the viewer can use to select a service, a start time, and an end time for a ómanual recordingô Manual recordings shall be added to the Recording List and Playback list in the same way as EIT/MHEG based recordings.	Opt	As a back up or alternative to EIT/MHEG based recording. It shall not be necessary for the EPG to display bookings made though this manual, time based DTR interface but the DTR will need to include these bookings in any conflict management.	

© Freeview Limited